REMARKS

Claims 1 – 9 are presented for reconsideration and further examination in view of the following remarks.

In the outstanding Final Office Action, the Examiner again rejected claims 1 - 8 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,825,892 to Braudaway et al. and further in view of U.S. Patent No. 6,137,892 to Powell et al.; and rejected claim 9 under 35 U.S.C. §103(a) as being unpatentable over Braudaway et al. and Powell et al. as applied to claim 1 and further in view of U.S. Patent No. 6,580,804 to Abe.

By this Response, no claims have been amended; and the prior art rejections are traversed.

Rejections Under 35 U.S.C. §103(a)

The Examiner rejected claims 1 – 8 as being unpatentable over Braudaway et al. in view of Powell et al.; and rejected claim 9 as being unpatentable over Braudaway et al. in view of Powell et al. as applied to claim 1 and further in view of Abe.

Response

Reconsideration and withdrawal of the rejections are respectfully requested.

To establish a *prima facie* case of obviousness, the Examiner must establish: (1) that some suggestion or motivation to modify the references exists; (2) a reasonable expectation of success; and (3) that the prior art references teach or suggest all the claim limitations. Amgen, Inc. v. Chugai Pharm. Co., 18 USPQ2d 1016, 1023 (Fed. Cir. 1991); In re Fine, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988); In re Wilson, 165 USPQ 494, 496 (C.C.P.A. 1970).

It is respectfully submitted that the combination of references fails to teach or suggest all the claim limitations.

One of the problems with the conventional digital watermarking methods is that watermarking and sending images require high costs and much time in transforming the images. Another problem is that watermarking the transformation coefficients calculated using the orthogonal transform, such as DCT (Discrete Cosine Transform), sometimes results in the loss of a watermark even when a simple low-pass filter is used. *See* Background of the Invention.

The apparatus and method according to the present invention transforms the intensity values or color difference values of the pixels in the second area of the predetermined area of the input image signals according to the encryption information produced by encrypting a digital watermark and outputs watermarked image signals. Therefore, with the adjacent image lines specified as the first and the second areas, a digital watermark may be embedded by taking full advantage of the nature that the correlation between adjacent lines is very high. *See* Specification, page 3, lines 12 - 21 and page 5, lines 6 - 14.

Further, the apparatus and method according to the present invention extracts the encryption data from the predetermined area of the watermarked image signals, generated by transforming the signals (intensity values and color difference values of the pixels in the second area) in the predetermined area of the image signals and then decrypts the encryption data. Therefore, the digital watermark may be reproduced. *See* Specification, page 6, lines 29 - 35 and page 8, lines 14 - 20.

The Examiner asserts that Braudaway et al. discloses selecting a rectangular cluster of pixels and works on pixels and adjacent pixels in columns 9, 10, and 16. However, the Examiner states that Braudaway et al. does not specify that the area has to be of a predetermined or larger than a base

value (i.e., more than one pixel in width). *See* Office Action at page 2. The Examiner maintains that even though Powell et al. is not expressly directed to a "line," it would have been obvious to one of ordinary skill in the art to apply the teachings of Powell et al. to Braudaway et al.

As discussed previously, Braudaway et al. fails to teach or suggest embedding a digital watermark in each line of image data by using the high correlation between adjacent lines such that the intensity level is modified by only a small value based on an encryption information bit [*emphasis added*].

In other words, there is no disclosure in the Braudaway et al. reference of a) "*transforming the intensity value or the color difference value of each pixel in the adjacent line...*" as recited in independent claim 1 and its corresponding method claim 3; b) "*for extracting from the adjacent line the encryption data...*" as recited in independent claim 5 and its corresponding method claim 7 [*emphasis added*].

The Examiner cites Powell et al. in an attempt to cure the deficiencies of Braudaway et al. regarding independent claims 1, 3, 5, and 7.

Powell et al. introduces a method using "a difference between averages" as a calculation example for selecting data elements to be changed based on an attribute of a neighboring group. *See* Abstract. Specifically, as shown in Figure 3, the method regards a block having 5 x 5 pixels as a unit, calculates a difference between an average of pixel values within a 3 x 3 pixel small neighborhood and an average of pixel values within a 5 x 5 pixel large neighborhood, and selects a block whose difference is large as a block into which a digital watermark information is to be embedded. *See* column 4, lines 10 - 51. Then, the method transforms intensity values of pixels in the selected block according to bits constituting the digital watermark information and accordingly realizes the

embedding of the information. The normalization process involves a sequence of steps to undo transformations previously made to the subject image to return it as close as possible to the resolution and appearance of the original image *See* column 5, line 66 to column 5, line 64.

In view of the above, detecting a block into which a digital watermark information is to be embedded is a main objective in Powell et al. employing a method using "a difference between averages."

In contrast, according to the present invention, an average of intensity values of pixels in one line (line A, for example) among two adjacent lines (*emphasis added*) is calculated, and the average value is compared with an intensity value of each pixel in the other line (line B, for example), and the number (first counter value) of pixels having intensity values larger than the average value and the number (second counter value) of pixels having intensity values smaller than the average value are counted, and the intensity value of each pixel in line B is transformed such that the first counter value and the second counter value becomes a relation according to bits constituting the digital watermark information to be embedded. *See* claims 1, 3, 5, and 7 of the present application and the equations on pages 10 and 11 of the Specification.

In other words, the average value processing according to the present invention is to calculate a reference value for embedding the digital watermark information, which is essentially different from the average value process in Powell et al. Instead, Powell et al. calculates maxima or minima based on the difference of averages method and displays them as a digital image.

Even *assuming arguendo* that an average value processing and an operation on an intensity value of each pixel for embedding an encrypted data are well known, Powell et al. does not teach or suggest the specific way of embedding a digital watermark according to the present invention.

Particularly, employing two adjacent line processing has the following advantage:

First, a line and an adjacent line thereof have very high correlation. Therefore, it is difficult to directly replace blocks in Powell et al. with two adjacent lines of the present invention for the following reasons:

i) It is difficult to select two lines to be embedded with a digital watermark due to the high correlation.

ii) It is difficult to apply the method using "the difference between averages" for 5 x 5 pixels to the two adjacent lines.

Further, according to the processing on the intensity value of a pixel in a block, image quality deterioration becomes conspicuous and a digital watermark information embedded using a filtering processing and a compression processing cannot occasionally be restored in Powell et al.

Focusing on the above point, the present invention employs two line processing, and accordingly, image quality deterioration is not conspicuous since the degree of intensity value transformation based on high correlation of pixels becomes rather small.

Furthermore, since one bit of a digital watermark information is embedded in a unit of two lines, it has redundancy while even when the intensity values of pixels are changed to be a filtering processing, a compression processing and so on, durability in recovering the embedded information becomes high by checking intensity value relation of pixels in the line.

Braudaway et al. inserts and detects an identifying mark on a work-piece. Powell et al. encodes a signature into a digital image and audits a digital subject image to determine if it was derived from the encoded image. The Examiner has stated that the teachings of Powell et al.

regarding block processing can be applied to adjacent "lines" to meet the claim limitations, but has not given any rationale or motivation for combining the two references to achieve the features of the invention, nor shown where in the Powell et al. reference (explicitly or implicitly) there is a discussion of applying the difference of averages methods to lines. "The test for an implicit showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art." *In re Kotzab*, 217 F.3d 1365, 1370, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000). See also *In re Lee*, 277 F.3d 1338, 1342-44, 61 USPQ2d 1430, 1433-34 (Fed. Cir. 2002) (discussing the importance of relying on objective evidence and making specific factual findings with respect to the motivation to combine references); *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992).

Therefore, Powell et al. fails to cure the deficiencies of Braudaway et al. regarding claims 1, 3, 5, and 7.

Abe teaches pixel-based digital watermarks located near edges of an image. The Examiner cites Abe in an attempt to cure the deficiencies of Braudaway et al. and Powell et al. regarding claim 9.

Even *assuming arguendo* that Abe teaches placing a digital watermark near or substantially along edges of an image, Abe fails to cure the deficiencies of the other two references. Namely, Abe fails to teach embedding encrypted information using modified intensity values of pixels in an odd-numbered line of a predetermined area based on the encryption information bit, and then outputting image signals as digitally watermarked image signals.

In view of the above, Applicants respectfully submit that the amended claims 1 - 9 define over Braudaway et al., Powell et al., and Abe taken either alone or in combination. Further, as the combination of references fail to teach or suggest all the limitations of claims 1 - 9 of the present invention, it is therefore respectively submitted that the rejections of claims 1 - 9 under 35 U.S.C. § 103(a) should be withdrawn.

CONCLUSION

In light of the foregoing, Applicants submit that the application is now in condition for allowance. If the Examiner believes the application is not in condition for allowance, Applicants respectfully request that the Examiner contact the undersigned attorney if it is believed that such contact will expedite the prosecution of the application.

In the event this paper is not timely filed, Applicants petition for an appropriate extension of time. Please charge any fee deficiency or credit any overpayment to Deposit Account No. 14-0112.

Respectfully submitted,
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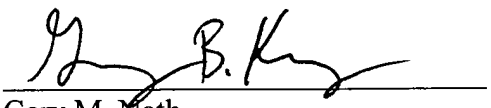
By: 

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